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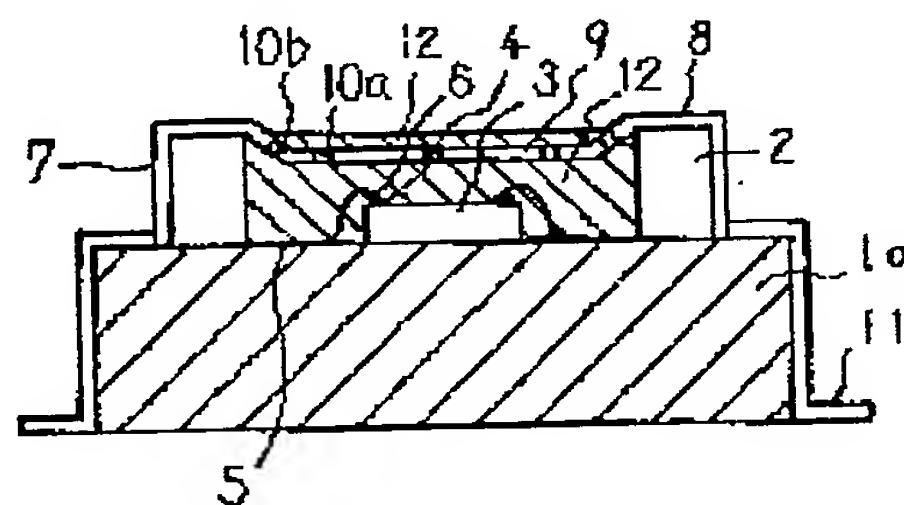
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(54) HYBRID INTEGRATED CIRCUIT DEVICE

(57)Abstract:

PURPOSE: To obtain a space saving shield structure of hybrid integrated circuit device in which a shield member can be bonded to a main board without relying on the soldering or screws.

CONSTITUTION: A resin frame 2 is arranged at the circumferential fringe on one surface of a wiring board 1a and an IC chip 3 is mounted in the center. The resin frame 2 is applied with a shielding metal housing 7 having an opening to be fitted to the outer circumference thereof. The metal housing 7 has bottom face 8 recessed toward the board side and a plurality of through ports 10a, 10b are made through the bottom face 8 of the recess 9. Furthermore, the housing has the fringe extended partially in terminal shape and bent downward along the side face of the board. The inner surface is bent down at a position where the inner surface is flush with the lower surface of the board 1a thus forming a shield electrode 11. Precoat resin 12 injected into the resin frame 2 applied with the metal housing 7 and into the recess 9 thereof is integrated through the through ports and bonded thus securing the metal housing 7.



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CLAIMS

[Claim(s)]

[Claim 1] Hybrid integrated circuit equipment characterized by having the case structure for a shield which fixes the aforementioned metal case to the aforementioned wiring substrate with the resin with which it filled up in the aforementioned metal case in the hybrid integrated circuit equipment of a wiring substrate which shielded these loading electronic-parts group by the metal case while the resin seal of a semiconductor chip and its circumference circuit element was carried and carried out to a field or both sides on the other hand.

[Claim 2] The aforementioned case structure for a shield The resin frame of the aforementioned substrate which surrounds the aforementioned loading electronic-parts group in the periphery section on a field, and is arranged in it on the other hand, It has the 1st metal case in which a part of aforementioned opening edge is extended in the shape of a terminal, and it forms the 1st screening electrode while denting a base in the aforementioned opening side and carrying out opening of two or more penetration mouths with opening which fits into this resin frame periphery. Hybrid integrated circuit equipment according to claim 1 which consists of composition that the precoat resin poured into the depression of the aforementioned metal case in the aforementioned resin frame was united, and fixed through the aforementioned penetration mouth, and the aforementioned metal case was fixed to the aforementioned substrate.

[Claim 3] The aforementioned case structure for a shield The resin frame of the aforementioned substrate which surrounds the aforementioned loading electronic-parts group in the periphery section on a field, and is arranged in it on the other hand, At the bottom [a part of] is deeply cut with opening which fits into this resin frame periphery, and it has the 2nd metal case in which a part of terminal for fixation which was bent below and formed, and aforementioned opening edge have the 2nd screening electrode which was extended in the shape of a terminal and formed. Hybrid integrated circuit equipment according to claim 1 which consists of composition that the aforementioned metal case was fixed to the aforementioned substrate when the precoat resin poured in into the aforementioned resin frame fixed the aforementioned fixed-end child at least.

[Claim 4] Opening of the depth predetermined in the aforementioned wiring substrate to the abbreviation center section by the side of an another side side and the crevice of a size is carried out. And while the slot of a predetermined size is arranged in the end face, a part of aforementioned electronic-parts group is carried in this crevice base. The 3rd metal case put on the aforementioned substrate has the 3rd screening electrode in which a part of edge was extended in the shape of a terminal, and it was formed while denting in the aforementioned crevice side and carrying out opening of two or more penetration mouths. It is in the state into which the aforementioned metal case was put on the aforementioned crevice, and the aforementioned slot and the 3rd screening electrode of the above fitted. Hybrid integrated circuit equipment according to claim 2 which consists of composition that the precoat resin poured in into the aforementioned crevice fixed united with the aforementioned precoat resin on the depression of the aforementioned metal case through the aforementioned penetration mouth, and the metal case of the above 2nd was fixed to the aforementioned substrate.

[Claim 5] Opening of the depth predetermined in the aforementioned wiring substrate to a

double-sided abbreviation center section and the crevice of a size is carried out, respectively. And while the slot of a predetermined size is arranged in each end face, the aforementioned electronic-parts group is carried in these crevice bases, respectively. The 4th and 5th metal cases put on aforementioned substrate both sides have the 4th in which a part of each edge was extended in the shape of a terminal, and it was formed while denting in each aforementioned crevice side and carrying out opening of two or more penetration mouths to each, and 5th screening electrodes. It is in the state into which the aforementioned metal case of the above 4th and the above 5th was put on the aforementioned crevice, and each aforementioned slot and above 4th, and the 5th screening electrode of the above fitted. Hybrid integrated circuit equipment according to claim 2 which consists of composition that the precoat resin poured in into each aforementioned crevice fixed united with the aforementioned precoat resin on the depression of the aforementioned metal case through each aforementioned penetration mouth, and the metal case of the above 4th and the above 5th was fixed to the aforementioned substrate.

[Claim 6] The aforementioned slot is hybrid integrated circuit equipment according to claim 4 or 5 by which opening is beforehand carried out to the depth to which the screening-electrode front face of the 3rd above 4th of the above or the above 5th and the end face of the aforementioned crevice are located in a coplanar.

[Claim 7] Hybrid integrated circuit equipment according to claim 2 or 3 which has the structure which the above 1st and the 2nd screening electrode of the above which were formed in the metal case of the above 1st and the above 2nd were bent in accordance with the aforementioned substrate side, and was further bent by the substrate base side or the substrate outside.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the hybrid integrated circuit equipment which has improved the fixed structure of the metal case for a shield with respect to hybrid integrated circuit equipment.

[0002]

[Description of the Prior Art] In order that the circuit scale held in a semiconductor device may also increase further and may respond to needs from a noncommercial device, an industrial use device, and other various industrial fields with progress of detailed-izing of a semiconductor device in recent years, the semiconductor device of various kinds of mounting gestalten has been developed with multi-functionalization.

[0003] Hybrid integrated circuit equipment is in one of the mounting gestalten of these. This equipment tends to load together circumference passive circuit elements, such as bare chips, such as a microcomputer by which interconnection is carried out by the circuit pattern by the conductor layer formed on the wiring substrate, memory, and a gate array, or resistance, and a capacitor, and tends to realize the function of a system scale. Only a bare chip or a passive chip may be carried depending on a use.

[0004] Thus, as a demand to the hybrid integrated circuit equipment by which functional enhancement was carried out, a cure in a noise, a visitor noise, etc. which are generated from hybrid integrated circuit equipment itself with improvement in the speed, RF-izing, and large power-ization is.

[0005] If drawing 6 (a) which showed an example in consideration of these cures against a noise of this kind of conventional hybrid integrated circuit equipment with the cross section is referred to, a semiconductor chip (IC chip is called hereafter) 32 is carried in the wiring substrate 31, bonding connection of the electrode group and circuit pattern 33 formed by the conductor layer on the substrate is made with a wire 34, and these composition members are protected by the precoat resin 35.

[0006] the composition to which the resin seal of the metal case 36 was carried out as a cure against a noise of this equipment -- it was covered on the member and the screening electrode 36 in which a part of end face of the metal case 36 was extended and formed is fixed to the grounding electrode on a substrate by the connection material 37

[0007] If drawing 6 (b) which showed other examples of conventional hybrid integrated circuit equipment with the cross section is referred to, on the other hand, a resin frame 39 is formed in a field, the IC chip 40 is carried in the field in this resin frame, bonding connection of the electrode group and circuit pattern formed on the substrate of the wiring substrate 38 is made with a wire 41, and these composition members of the resin frame 39 interior are protected by the precoat resin 42.

[0008] This substrate 38 is further pasted up on the main substrate 43 by the connection material 44. In the case of this example, the metal case 45 was put on the substrate 38 whole, and metal case 45 the very thing fixed by the jointing material 45 to the main substrate 43, or it was fixed by the screw stop, and was considering as the cure against a shield.

[0009] If drawing 6 (c) which showed the example of further others of conventional hybrid integrated circuit equipment with the cross section is referred to, the circumference passive circuit elements 47 are fixed and carried in the upper surface of the wiring substrate 46 by the connection material 48, and the IC chip 49 is protected and carried in the rear face by the back precoat resin 50 which fixed by connection material similarly. Where the clip terminal 51 is attached, in the metal case 52, this substrate 46 used the closure resin and was being fixed.

[0010]

[Problem(s) to be Solved by the Invention] As mentioned above and carried out, the shield structure in conventional hybrid integrated circuit equipment protected the bare chip by the precoat resin, and was considering it as the cure against a shield according to the structure which fixes a metal case with adhesives to a wiring substrate, or is fixed by the screw stop.

[0011] Therefore, adhesives or the screw member was required only because of these fixing or fixation, the connection process was also further needed and the manufacturing cost was pushed up.

[0012] furthermore -- in order to shield -- cover -- the metal case which is a member needed to be electrically made into grounding potential, and the space for the screw stop for it or soldering was further needed, and had become the obstacle of a miniaturization

[0013] The purpose of this invention is made in view of an above-mentioned fault, and is to offer the shield structure of a ** space of pasting up the shield member in hybrid integrated circuit equipment on the main substrate, without using either soldering or a screw stop.

[0014]

[Means for Solving the Problem] The feature of the hybrid integrated circuit equipment of this invention is in the hybrid integrated circuit equipment of a wiring substrate which shielded these loading electronic-parts group by the metal case while the resin seal of a semiconductor chip and its circumference circuit element was carried and carried out to a field or both sides on the other hand to have the case structure for a shield which fixes the aforementioned metal case to the aforementioned wiring substrate with the resin with which it filled up in the aforementioned metal case.

[0015] The aforementioned case structure for a shield Moreover, the resin frame of the aforementioned substrate which surrounds the aforementioned loading electronic-parts group in the periphery section on a field, and is arranged in it on the other hand, It has the 1st metal case in which a part of aforementioned opening edge is extended in the shape of a terminal, and it forms the 1st screening electrode while denting a base in the aforementioned opening side and carrying out opening of two or more penetration mouths with opening which fits into this resin frame periphery. making it the composition in which the precoat resin poured into the depression of the aforementioned metal case in the aforementioned resin frame was united, and fixed through the aforementioned penetration mouth, and the aforementioned metal case was fixed to the aforementioned substrate comes out, and it comes

[0016] The aforementioned case structure for a shield Furthermore, the resin frame of the aforementioned substrate which surrounds the aforementioned loading electronic-parts group in the periphery section on a field, and is arranged in it on the other hand, At the bottom [a part of] is deeply cut with opening which fits into this resin frame periphery, and it has the 2nd metal case in which a part of terminal for fixation which was bent below and formed, and aforementioned opening edge have the 2nd screening electrode which was extended in the shape of a terminal and formed. When the precoat resin poured in into the aforementioned resin frame fixes the aforementioned fixed-end child at least, the aforementioned metal case can also make it the composition fixed to the aforementioned substrate.

[0017] Opening of the depth predetermined in the aforementioned wiring substrate to the abbreviation center section by the side of an another side side and the crevice of a size is carried out further again. And while the slot of a predetermined size is arranged in the end face, a part of aforementioned electronic-parts group is carried in this crevice base. The 3rd metal case put on the aforementioned substrate has the 3rd screening electrode in which a part of edge was extended in the shape of a terminal, and it was formed while denting in the aforementioned crevice side and carrying out opening of two or more penetration mouths. It is in

the state into which the aforementioned metal case was put on the aforementioned crevice, and the aforementioned slot and the aforementioned screening electrode fitted. It can also consider as the composition in which the precoat resin poured in into the aforementioned crevice fixes united with the aforementioned precoat resin on the depression of the aforementioned metal case through the aforementioned penetration mouth, and the metal case of the above 2nd is fixed to the aforementioned substrate.

[0018] Moreover, opening of the depth predetermined in the aforementioned wiring substrate to a double-sided abbreviation center section and the crevice of a size is carried out, respectively. And while the slot of a predetermined size is arranged in each end face, the aforementioned electronic-parts group is carried in these crevice bases, respectively. The 4th and 5th metal cases put on aforementioned substrate both sides have the 4th in which a part of each edge was extended in the shape of a terminal, and it was formed while denting in each aforementioned crevice side and carrying out opening of two or more penetration mouths to each, and 5th screening electrodes. It is in the state into which the aforementioned metal case of the above 4th and the above 5th was put on the aforementioned crevice, and each aforementioned slot and above 4th, and the 5th screening electrode of the above fitted. It can also consider as the composition in which the precoat resin poured in into each aforementioned crevice fixed united with the aforementioned precoat resin on the depression of the aforementioned metal case through each aforementioned penetration mouth, and the above 4th and the 5th metal case were fixed to the aforementioned substrate, respectively.

[0019] Furthermore, opening of the aforementioned slot is beforehand carried out to the depth to which the screening-electrode front face of the 3rd above 4th of the above or the above 5th and the end face of the aforementioned crevice are located in a coplanar.

[0020] It can also have the structure which the above 1st and the 2nd screening electrode of the above which were formed in the metal case of the above 1st and the above 2nd were bent in accordance with the aforementioned substrate side further again, and was further bent by the substrate base side or the substrate outside. It is in (a claim 1).

[0021]

[Example] Next, it explains, referring to a drawing about the example of this invention.

[0022] Drawing 1 is the cross section showing the 1st example of the hybrid integrated circuit equipment of this invention. Reference of drawing 1 arranges the resin frame 2 so that this hybrid integrated circuit equipment may surround an element-placement field in the periphery section on the direction of one of the wiring substrate 1. Using an epoxy resin, it fixes to a substrate 1 with adhesives, and this resin frame 2 is formed. The IC chip 3 is carried in an element-placement field, and bonding connection of the electrode group 4 and the circuit pattern 5 formed in the element-placement field by the conductor layer is made with the wire 6.

[0023] Furthermore, the metal housing 7 with opening which fits into the periphery for a shield is put on the resin frame 2. Opening of two or more penetration mouths 10a and 10b is carried out to the crevice 9 which was able to dent the portion on the internal field where the base 8 of this metal housing 7 was surrounded by the resin frame 2 to the substrate side. A part of housing edge is bent downward so that it may be extended in the shape of a terminal and the substrate side may be met, it gets down outside, and it is bent in the position where the field of the inside turns into the same field as the inferior surface of tongue of substrate 1a, and forms the screening electrode 11.

[0024] the metal case 7 -- processing it -- easy -- electromagnetism -- it is desirable to use a metallic material with a high shielding effect, and in order to make pewter connection of the screening electrode 11 at the grounding potential of the main substrate (not shown) in which this hybrid integrated circuit equipment is carried, it is necessary to carry out surface treatment with the material which can solder the front face of this screening electrode 11, or to use further, the quality of the material which can be soldered to metal case 7 the very thing

[0025] The precoat resin 12 of the interior surrounded by the resin frame 2 which put this metal case 7, and the precoat resin 12 poured into the crevice 9 of the metal housing 7 consist of composition which is united, fixes through a penetration mouth and fixes the metal case 7.

[0026] If drawing 2 (a) which showed the perspective diagram of a metal housing, drawing 2 (b)

which showed the perspective diagram in the state where the resin frame was pasted up on the substrate, and drawing 2 (c) which showed the perspective diagram in the state where the metal housing was put on the resin frame are referred to The manufacture method of hybrid integrated circuit equipment of having mounted the metal case for a shield mentioned above electromagnetism -- the metal case 7 which prepared the screening electrode which 10b opened penetration mouth 10a in the crevice 9 at the bottom is prepared by bending using processing technology general to the high metal plate of a shielding effect, and giving cutting and punching processing (drawing 2 (a).)

[0027] On the other hand, two or more electrodes 13 for surface mounts are arranged in the lateral portion by well-known printed wiring technology, the resin frame 2 mentioned above pastes up wiring substrate 1a, and the semiconductor chip 3 is carried in the center section (drawing 2 (b).)

[0028] The precoat resin 12 is poured in using well-known resin enclosure technology into the field surrounded by the resin frame 2 on this substrate 1. Before the precoat resin 12 is filled to the limit of within the limit (for example, good by about 90% of within the limit capacity), where pouring is once stopped, by laying the metal case 7 in the wiring substrate 1, the crevice 9 of the metal case 7 will be inserted in inside a resin frame 2, and by the depression of this crevice 9, the precoat resin 12 is extruded by the front face of a crevice 9 from the penetration mouth 10, and spreads on the whole surface in a crevice.

[0029] After regrouting the precoat resin 12 until it fills a crevice 9 with this state, by making it dry, through the penetration mouth 10, the precoat resin 12 of the internal field of a resin frame 2 and the precoat resin 12 filled in the crevice 9 are united, fixes, and it fixes the metal case 7 on a substrate 1. At this time, the screening electrode 11 is in the state where it is extended in accordance with the side of a substrate 1, and is located in the same field as a substrate base (drawing 2 (b).) .

[0030] In addition, once pouring of the precoat resin 12 stops pouring at about 50% of a resin frame field, it lays the metal case 7 on a substrate 1, and you may make it fill it to a crevice 10 by missing the pneumatic pressure in a crevice 9 from penetration mouth 10b of the side of a crevice 9 by regrouting the precoat resin 12 from the penetration mouth 10 of the flat part of a crevice 9.

[0031] In order to carry the hybrid integrated circuit equipment obtained by the manufacture method mentioned above in the main substrate, a screening electrode 11 is aligned and laid in the grounding potentiometric electrode on the main substrate, and it connects by the well-known pewter reflow method.

[0032] If drawing 3 (b) which showed the cross section in drawing 3 (a) and cutting-plane-line X-Y which showed the plan as the configuration and the modification of the installation method of the metal case 7 is referred to The base of the metal case 14 has been made flat to, as for the difference with the metal case 7 mentioned above, the metal case 7 having formed the crevice 9 in the case base, and having formed two or more circular penetration mouths 10 in this crevice That is, it is having arranged the terminal 16 for fixation which formed the penetration mouth 15 which cut and lacked three sides greatly in the shape of a rectangle, and bent and formed one side which remained in the bottom in the penetration mouth 15 of each side, without forming a crevice. Other configurations are the same as that of the metal case 7.

[0033] The manufacture method of the hybrid integrated circuit equipment at the time of using this metal case 14 pours in the precoat resin 12 into the field surrounded by the resin frame 2. After filling the precoat resin 12 to the limit of within the limit, by laying the metal case 14 in wiring substrate 1a By *****ing the fixed-end child 16 of the metal case 14 inside a resin 2, and making it dry, after the precoat resin 12 has filled the penetration mouth 15 The precoat resin 12 and the terminal 16 for fixation of an internal field of a resin frame 2 are made to fix in a crevice, and the metal case 14 is fixed on substrate 1a. In the case of this method, the pouring process of the precoat resin 12 has the advantage which can be managed at a time.

[0034] When drawing 4 which showed the 2nd example of this invention with the cross section is referred to, next, the difference with the 1st example While using substrate 1b which electronic parts 17 were carried in the internal field surrounded by the resin frame 2, and thickened board

thickness Opening of the crevice 18 is carried out to the rear-face side of this substrate 1b, a semiconductor chip 3 is carried in this crevice base, and bonding connection of the electrode group and the circuit pattern formed in crevice 18 field by the conductor layer is made with the wire 6.

[0035] Furthermore, the metal housing 19 with opening which fits into the periphery for a shield is put on substrate base 1b. The crevice base of this metal housing 19 is bent downward by the L character type, and forms the screening electrode 21 so that a part of housing edge may be extended in the shape of a terminal and it may meet the substrate side while opening of two or more penetration mouths 20a and 20b is carried out. electromagnetism -- it is the same as that of the metal case 7 to use a metallic material with a high shielding effect

[0036] Opening of the slot 22 for the portion to which the screening electrode 21 mentioned above touches the periphery section of substrate 1b inserting in a screening electrode 21 is carried out, and it is beforehand decided that the front face of the screening electrode 21 in which the depth was inserted with the substrate end face is located in a line with the same side.

[0037] It is the same as that of a screening electrode 11 to carry out surface treatment to the grounding potential of the main substrate in which this hybrid integrated circuit equipment is carried with the material which can solder the front face of this screening electrode 21 in order to make pewter connection of the screening electrode 21, or to use the quality of the material which can solder metal case 19 the very thing.

[0038] In addition, although the portion in which the screening electrode 11 of the metal case 7 put on a resin frame 2 is extended in accordance with the part substrate side in which the board thickness of substrate 1b became thick becomes long, the electrode section soldered to the main substrate is the same configuration as an example 1.

[0039] The precoat resin 12 poured in into the interior surrounded by the resin frame 2 which put this metal case 7, and the crevice 18 of a substrate consists of composition which the precoat resin 12 of the metal case upper part is united, fixes, and fixes each metal case through the penetration mouth of each metal case 7 and 19.

[0040] If drawing 5 (a) which showed the elements on larger scale when putting the metal housing 19 on drawing 5 (a) and substrate 1b which showed the perspective diagram of the metal housing 19 and substrate 1b with the perspective diagram is referred to The manufacture method of hybrid integrated circuit equipment of having mounted the metal case for a shield mentioned above in both sides the 1st example -- the same -- electromagnetism -- a chip box is bent to the high metal plate of a shielding effect, and the metal cases 7 and 19 which formed the screening electrodes 11 and 21 which carried out opening of the penetration mouths 10a and 10b, and 20a and 20b in the crevices 9 and 23 at the bottom are prepared using cutting and punching processing

[0041] On the other hand, two or more electrodes 13 for surface mounts are arranged in the lateral portion, the resin frame 2 mentioned above pastes up, electronic parts 17 are carried in a center section, and wiring substrate 1b prepares for the crevice 18 on the rear face of a substrate substrate 1b in which the semiconductor chip 3 was carried, respectively.

[0042] After pouring in the precoat resin 12 by the same method as the 1st example and fixing the metal case 7 in the field surrounded by the resin frame 2 on this substrate 1b, the vertical direction is made reverse and the precoat resin 12 by the side of a substrate crevice is poured in.

[0043] Before the precoat resin 12 is filled to the limit of the inside of a crevice also in this case, where pouring is once stopped, by laying the metal case 19 in wiring substrate 1b, and changing into the state where the screening electrode 19 was inserted in the slot 22 of a substrate end face, the precoat resin 12 in this crevice 18 is extruded by the front face of the crevice 18 of the metal case 19 from the penetration mouths 20a and 20b, and spreads on the whole surface in a crevice.

[0044] After regrouting a precoat resin until it fills a crevice with this state, by making it dry, through the penetration mouths 20a and 20b, the precoat resin in the crevice 18 of substrate 1b and the precoat resin 12 filled in the crevice 23 of the metal case 19 are united, fixes, and it fixes the metal case 19 on substrate 1b.

[0045] At this time, both the screening electrode 11 of the metal case 7 and the screening electrode 21 of the metal case 19 are in the state where it is located in a coplanar so that each one direction may touch the grounding electrode of the main substrate.

[0046] In order to carry the hybrid integrated circuit equipment obtained by the manufacture method mentioned above in the main substrate, screening electrodes 11 and 21 are aligned to the grounding potentiometric electrode on the main substrate, respectively, and are laid in it, and it connects by the pewter reflow method.

[0047] In addition, in the 2nd example mentioned above, although the crevice was formed only in one side of substrate 1b, you may form the same crevice as both sides of substrate 1b. That is, wiring substrate 1b carries an electronic-parts group in these crevice bases, respectively while opening of the crevice of the depth which can carry predetermined electronic parts 17 or a predetermined semiconductor chip 3 in a double-sided abbreviation center section, and a size is carried out, respectively and the slot of a predetermined size is arranged in each end face.

[0048] The metal case put on substrate 1b both sides is dented in each crevice side, and opening of two or more penetration mouths is carried out to each. Moreover, it has the screening electrode in which a part of each edge was extended in the shape of a terminal, and it was formed. The composition that the precoat resin poured in into each crevice was united, and fixed through each penetration mouth after it put the metal case on the crevice and the slot and terminal electrode edge of ***** had fitted in, and the metal case was fixed to the substrate may be used.

[0049] The precoat resin used in the 1st and 2nd examples will not be limited especially if it is the heat-resistant insulating resin which can bear the pewter reflow method.

[0050] Moreover, by connection resilience becoming weak although processing is easy when the board thickness of the metal cases 1a and 1b is thin, when thick, although an end-connection child's intensity is maintained, processing carries out in difficulty and is, and it is **. Therefore, about 50-250mm material of board thickness is desirable.

[0051] Furthermore, it is not limited only to the configuration and quantity which are possible for deformation if the configuration of the metal cases 1a and 1b, the configuration of a penetration mouth, and quantity meet the meaning of the example mentioned above, and were stated to the example.

[0052]

[Effect of the Invention] As explained above, the hybrid integrated circuit equipment of this invention The resin frame of a substrate which surrounds a loading electronic-parts group in the periphery section on a field, and is arranged in it on the other hand, While denting a base in an opening side and carrying out opening of two or more penetration mouths with opening which fits into this resin frame periphery The composition which the precoat resin which has the 1st metal case in which a part of opening edge is extended in the shape of a terminal, and it forms the 1st screening electrode, was dented in the resin frame, and was poured into the section is united, fixes through a penetration mouth, and fixes a metal case, Opening of the predetermined depth and the crevice of a size is carried out to the abbreviation center section by the side of the another side side of a wiring substrate. And while the slot of a predetermined size is arranged in the end face, a part of electronic-parts group is carried in this crevice base. The 3rd metal case put on a substrate is in the state to which it has the 3rd screening electrode in which a part of edge was extended in the shape of a terminal, and it was formed while denting in the crevice side and carrying out opening of two or more penetration mouths, the metal case was put on the crevice, and the slot and the screening electrode fitted into a substrate end face and flatness. Since it has either of the composition of the precoat resin poured in into the crevice being united, fixing through a penetration mouth, and fixing the 2nd metal case to a substrate, restoration of a precoat resin and adhesion of the metal case for a shield can be performed simultaneously, and shortening of a manufacturing process is possible. Moreover, since a metal case is constituted in an element-placement substrate and one, a space special for shield structure is not needed, but the increase in a component-side product can be suppressed low.

[0053] Furthermore, since the main substrate side can be mounted while it has been flat, a special perforating process is not needed to the main substrate for a shield, but even when

loading together hybrid integrated circuit equipment by double-sided mounting to the main substrate, it can apply.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the cross section showing the 1st example of this invention.

[Drawing 2] (a) It is the perspective diagram of the metal housing in the 1st example.

(b) It is a perspective diagram in the state where the resin frame was pasted up on the substrate.

(c) It is a perspective diagram in the state where the metal housing was put on the resin frame.

[Drawing 3] (a) It is the plan showing the configuration and the modification of the installation method of the metal case 7.

(b) It is a cross section in cutting-plane-line X-Y of the (a) view.

[Drawing 4] It is the cross section showing the 2nd example of this invention.

[Drawing 5] (a) It is the perspective diagram of the metal housing 19 and substrate 1b.

(b) It is the perspective diagram having shown the elements on larger scale when putting the metal case 19 on substrate 1b.

[Drawing 6] (a) It is the cross section having shown an example in consideration of the cure against a noise of this kind of conventional hybrid integrated circuit equipment.

(b) It is the cross section having shown other examples of conventional hybrid integrated circuit equipment.

(c) It is the cross section having shown the example of further others of conventional hybrid integrated circuit equipment.

[Description of Notations]

1a, 1b, 31, 38, 46 Wiring substrate

2 Resin Frame

3, 32, 40, 49 Semiconductor chip

4 Electrode Group

5 33 Circuit pattern

6, 34, 41 Wire

7, 14, 19, 52 Metal case

8 Base of Metal Case

9 23 Crevice of a metal case

10a, 10b, 15, 20a, 20b Penetration mouth

11 21 Screening electrode

12, 35, 42, 50 Precoat resin

13 Substrate Electrode Group

16 Terminal for Fixation

17 47 Electronic parts

18 Crevice of Substrate

22 Slot

24 Electronic Parts

43 The Main Substrate

44, 45, 48 Jointing material

51 Clip Terminal

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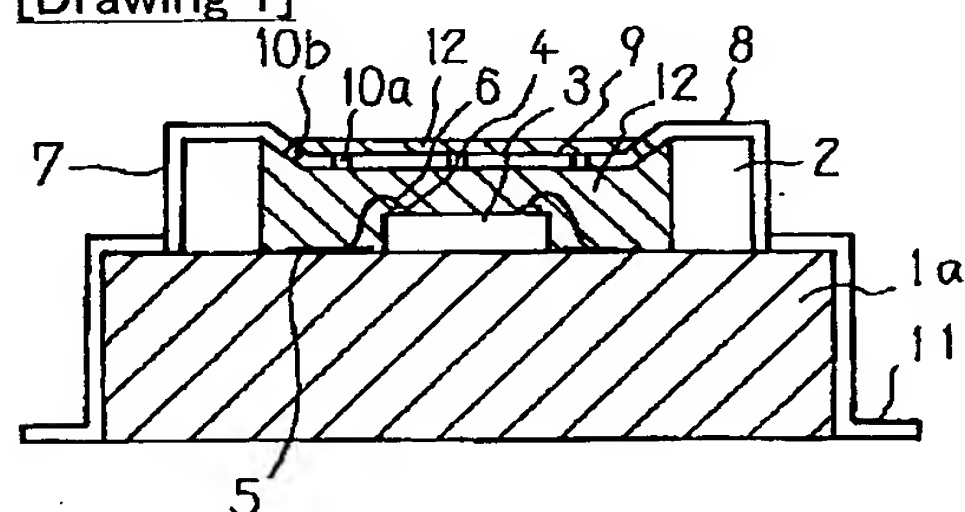
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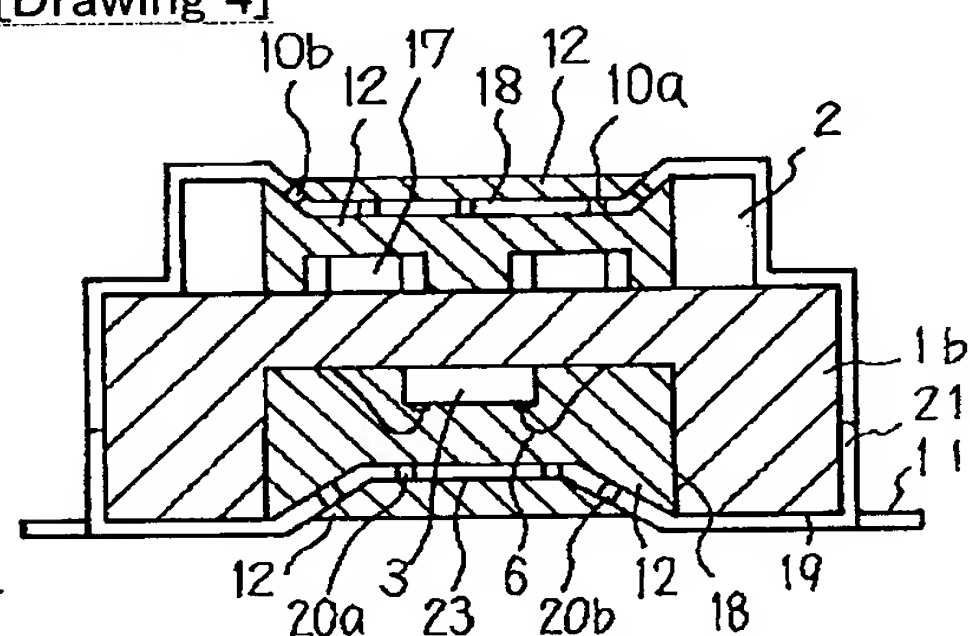
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DRAWINGS

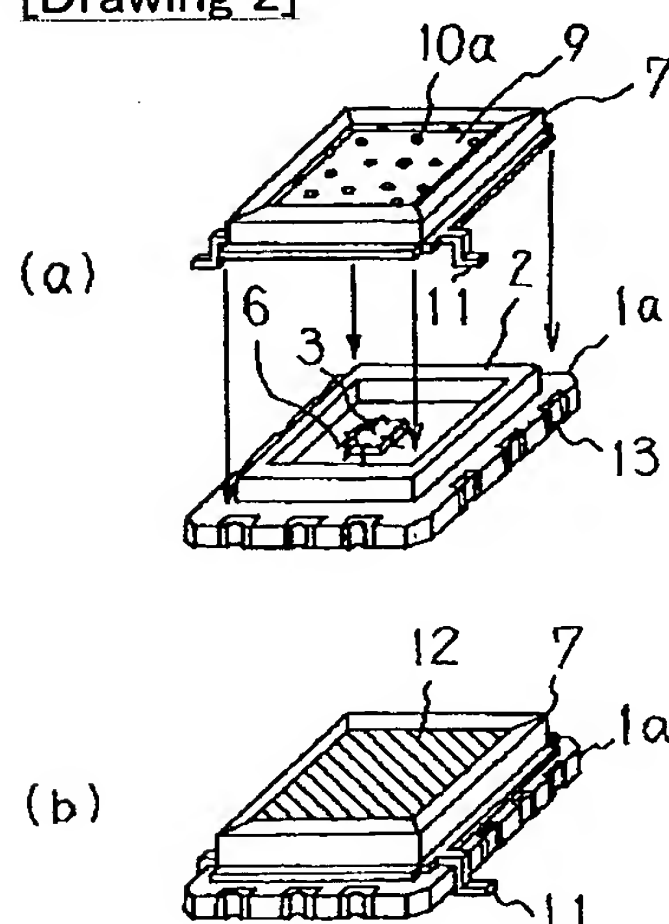
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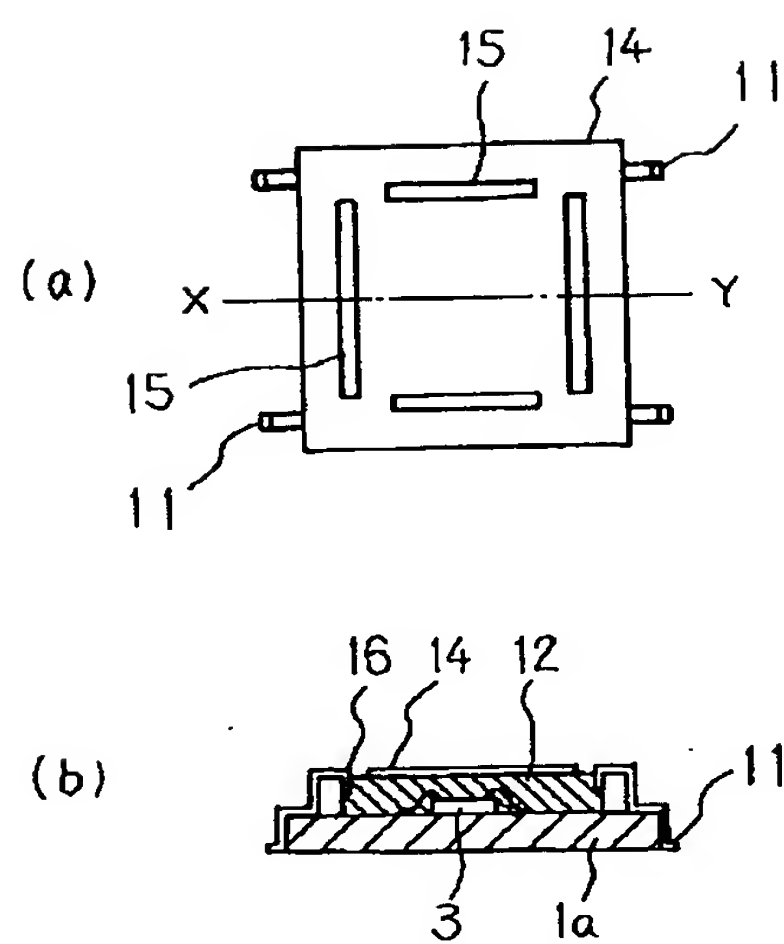
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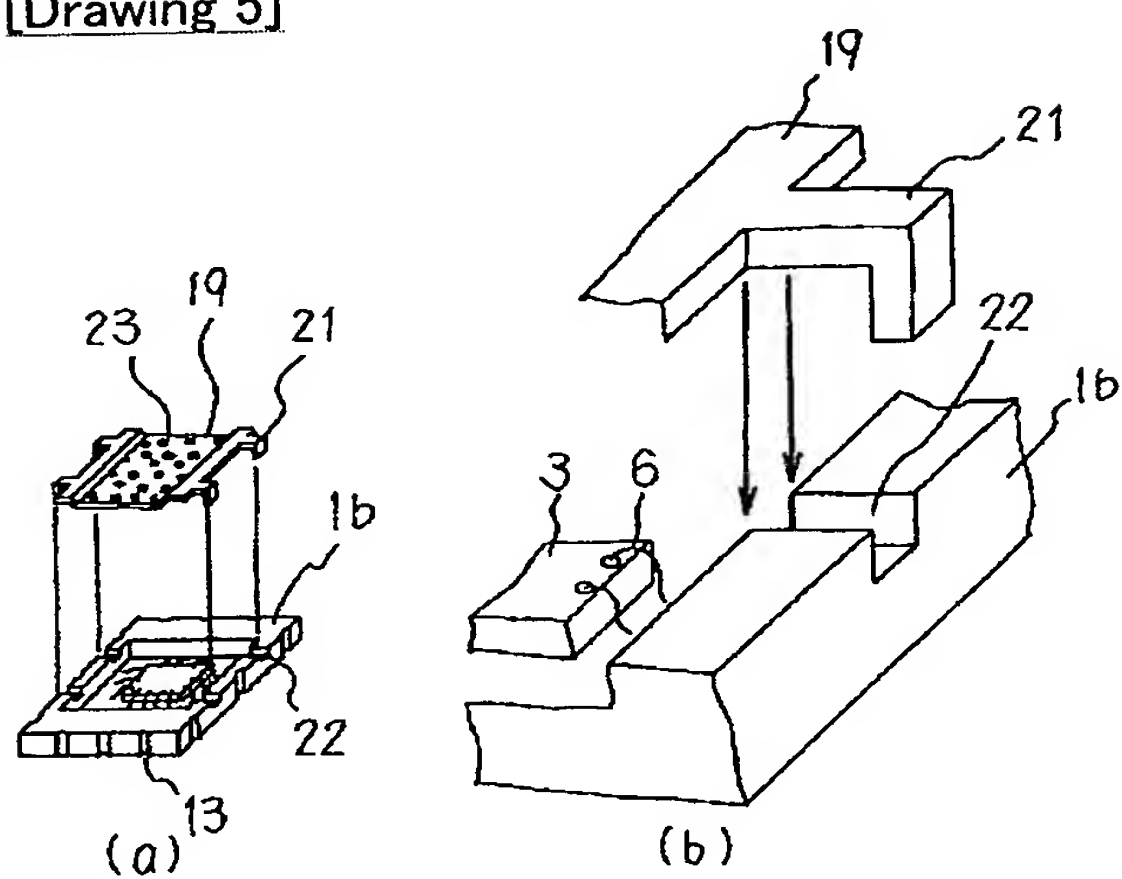
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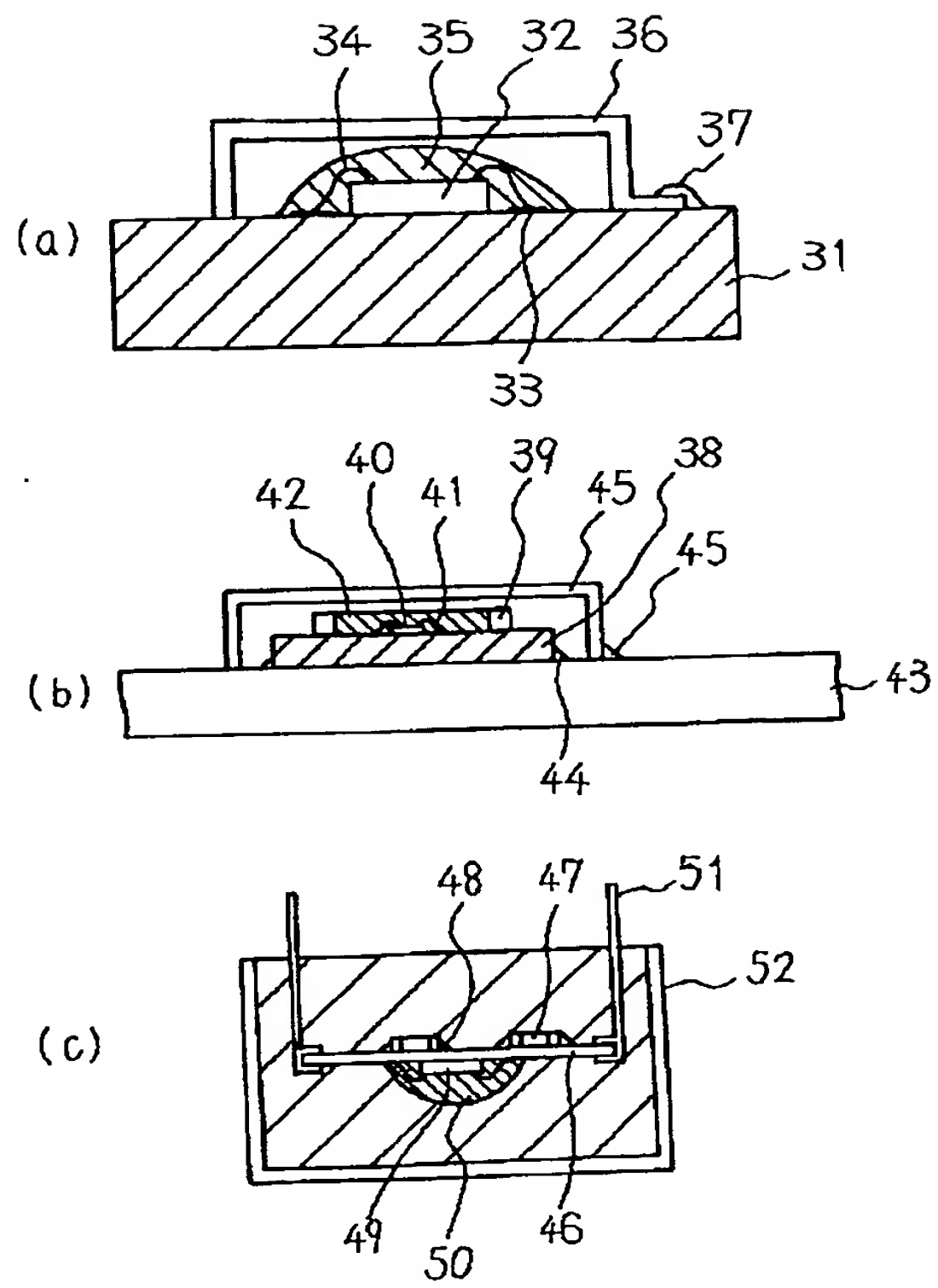
[Drawing 3]



[Drawing 5]



[Drawing 6]



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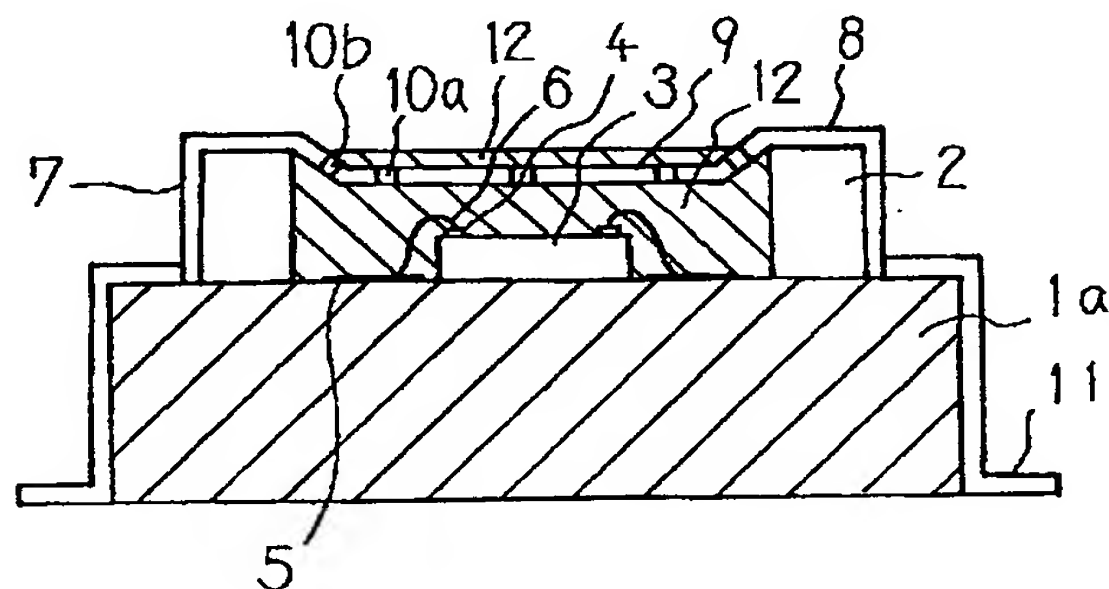
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(54)【発明の名称】 混成集積回路装置

(57)【要約】

【目的】混成集積回路装置におけるシールド部材をハンダ付けまたはビス止めのいずれをも用いずに主基板に接着する省スペースのシールド構造を提供する。

【構成】配線基板1の一方面上の周縁部に樹脂枠2が配設され、その中央部にはICチップ3が搭載されている。さらに樹脂枠2にはその外周に嵌合する開口部をもつシールド用の金属筐体7が被せてあり、この金属筐体7の底面8を基板側に凹ませた凹部9に複数の貫通口10aおよび10bが開口されるとともに、筐体縁端の一部が端子状に延長されて基板側面に沿うように下へ折り曲げられ、その内側の面が基板1aの下面と同一面になる位置で外側に下り曲げてシールド電極11を形成している。この金属筐体7を被せた樹脂枠2内部と金属筐体7の凹部9に注入されたプリコート樹脂12が貫通口を介して一体となって固着し金属筐体7を固定する構成からなる。



【特許請求の範囲】

【請求項 1】 配線基板の一方面または両面に半導体チップおよびその周辺回路素子が搭載されて樹脂封止されるときともにこれら搭載電子部品群を金属筐体でシールドした混成集積回路装置において、前記金属筐体内に充填された樹脂によって前記金属筐体を前記配線基板に固定するシールド用筐体構造を備えることを特徴とする混成集積回路装置。

【請求項 2】 前記シールド用筐体構造は、前記基板の一方面上の周縁部に前記搭載電子部品群を囲んで配設される樹脂枠と、この樹脂枠外周に嵌合する開口部をもち底面が前記開口部側に凹みかつ複数の貫通口が開口されるときともに前記開口部縁端の一部が端子状に延長されて第 1 のシールド電極を形成する第 1 の金属筐体とを有し、前記樹脂枠内と前記金属筐体の凹みに注入されたプリコート樹脂が前記貫通口を介して一体となって固着し前記金属筐体が前記基板に固定された構成からなる請求項 1 記載の混成集積回路装置。

【請求項 3】 前記シールド用筐体構造は、前記基板の一方面上の周縁部に前記搭載電子部品群を囲んで配設される樹脂枠と、この樹脂枠外周に嵌合する開口部をもち底面の一部が切り込まれかつ下方に折り曲げられて形成された固定用端子および前記開口部縁端の一部が端子状に延長されて形成された第 2 のシールド電極をもつ第 2 の金属筐体とを有し、前記樹脂枠内に注入されたプリコート樹脂が少なくとも前記固定端子を固着することによって前記金属筐体が前記基板に固定された構成からなる請求項 1 記載の混成集積回路装置。

【請求項 4】 前記配線基板は他方面側の略中央部に所定の深さおよび大きさの凹部が開口され、かつその端面に所定の大きさの溝が配設されるときともにこの凹部底面に前記電子部品群の一部を搭載し、前記基板に被せる第 3 の金属筐体は前記凹部側に凹みかつ複数の貫通口が開口されるときともに縁端の一部が端子状に延長されて形成された第 3 のシールド電極を有し、前記金属筐体を前記凹部に被せて前記溝と前記第 3 のシールド電極とが嵌合した状態であって、前記凹部内に注入されたプリコート樹脂が前記貫通口を介して前記金属筐体の凹み上の前記プリコート樹脂と一体となって固着し前記第 2 の金属筐体が前記基板に固定された構成からなる請求項 2 記載の混成集積回路装置。

【請求項 5】 前記配線基板は両面の略中央部に所定の深さおよび大きさの凹部がそれぞれ開口され、かつそれぞれの端面に所定の大きさの溝が配設されるときともにこれらの凹部底面に前記電子部品群をそれぞれ搭載し、前記基板両面に被せる第 4 および第 5 の金属筐体は前記各凹部側に凹みかつそれぞれに複数の貫通口が開口されるときともにそれぞれの縁端の一部が端子状に延長されて形成された第 4 および第 5 のシールド電極を有し、前記第 4 および前記第 5 の前記金属筐体を前記凹部に被せてそ

れぞれの前記溝と前記第 4 および前記第 5 のシールド電極とが嵌合した状態であって、それぞれの前記凹部内に注入されたプリコート樹脂がそれぞれの前記貫通口を介して前記金属筐体の凹み上の前記プリコート樹脂と一体となって固着し前記第 4 および前記第 5 の金属筐体が前記基板に固定された構成からなる請求項 2 記載の混成集積回路装置。

【請求項 6】 前記溝は、前記第 3、前記第 4 または前記第 5 のシールド電極表面と前記凹部の端面とが同一平面上に位置する深さにあらかじめ開口される請求項 4 または 5 記載の混成集積回路装置。

【請求項 7】 前記第 1 および前記第 2 の金属筐体に形成された前記第 1 および前記第 2 のシールド電極が前記基板側面に沿って折り曲げられさらに基板底面側または基板外側に折り曲げられた構造を有する請求項 2 または 3 記載の混成集積回路装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は混成集積回路装置に係わり、特にシールド用金属筐体の固定構造を改善した混成集積回路装置に関する。

【0002】

【従来の技術】近年、半導体素子の微細化の進展に伴ない、半導体装置に收容される回路規模もさらに増大し、民生用機器、工業用機器、その他いろいろな産業分野からのニーズに応えるために多機能化とともに各種の実装形態の半導体装置が開発されてきた。

【0003】これらの実装形態の一つに混成集積回路装置がある。この装置は、配線基板上に形成された導体層による配線パターンで相互接続されるマイコン、メモリ、ゲートアレイ等のベアチップ、あるいは抵抗、コンデンサ等の周辺回路部品を混載し、システム規模の機能を実現しようとするものである。用途によっては、ベアチップのみ、あるいは受動チップ部品のみが搭載される場合もある。

【0004】このように機能強化された混成集積回路装置に対する要求としては、高速化、高周波化、大電力化とともに、混成集積回路装置自身から発生するノイズおよび外来ノイズ等に対する対策がある。

【0005】これらのノイズ対策を考慮したこの種の従来の混成集積回路装置の一例を断面図で示した図 6

(a) を参照すると、配線基板 31 に半導体チップ（以下、IC チップと称す）32 が搭載され、その電極群と基板上に導体層で形成された配線パターン 33 とがワイヤ 34 でボンディング接続され、これらの構成部材がプリコート樹脂 35 で保護されている。

【0006】この装置のノイズ対策として、金属筐体 36 が樹脂封止された構成部材の上に被せられ、金属筐体 36 の端面が一部延長されて形成されたシールド電極 36 を接続材 37 で基板上の接地電極に固着している。

【0007】従来の混成集積回路装置の他の例を断面図で示した図6（b）を参照すると、配線基板38の一面に樹脂枠39が設けられ、この樹脂枠内の領域にICチップ40が搭載され、その電極群と基板上に形成された配線パターンとがワイヤ41でボンディング接続され、樹脂枠39内部のこれらの構成部材がプリコート樹脂42で保護されている。

【0008】この基板38はさらに主基板43に接続部材44で接着される。この例の場合は基板38全体の上に金属筐体45を被せ、金属筐体45自体は主基板43に接着部材45により固着されまたはネジ止めにより固定され、シールド対策としていた。

【0009】従来の混成集積回路装置のさらに他の例を断面図で示した図6（c）を参照すると、配線基板46の上面には周辺回路部品47が接続材48で固着されて搭載され、裏面にはICチップ49が同様に接続材で固着された後プリコート樹脂50で保護されて搭載されている。この基板46がクリップ端子51を取付けた状態で、金属筐体52内に封止樹脂を用いて固定されていた。

【0010】

【発明が解決しようとする課題】上述したように、従来の混成集積回路装置におけるシールド構造は、ベアチップをプリコート樹脂で保護し、金属筐体を配線基板に接着剤により固着するかまたはネジ止めにより固定する構造により、シールド対策としていた。

【0011】そのため、これらの固着または固定のためだけに接着剤またはネジ部材が必要であり、さらにその接続工程も必要となって製造コストを押し上げていた。

【0012】さらに、シールドをするためには、遮蔽部材である金属筐体を電氣的に接地電位にする必要があり、そのためのネジ止めまたはハンダ付けのためのスペースがさらに必要となり小型化の障害となっていた。

【0013】本発明の目的は、上述の欠点に鑑みなされたものであり、混成集積回路装置におけるシールド部材をハンダ付けまたはビス止めのいずれをも用いることなく主基板に接着する省スペースのシールド構造を提供することにある。

【0014】

【課題を解決するための手段】本発明の混成集積回路装置の特徴は、配線基板の一方面または両面に半導体チップおよびその周辺回路素子が搭載されて樹脂封止されるとともにこれら搭載電子部品群を金属筐体でシールドした混成集積回路装置において、前記金属筐体内に充填された樹脂によって前記金属筐体を前記配線基板に固定するシールド用筐体構造を備えることにある。

【0015】また、前記シールド用筐体構造は、前記基板の一方面上の周縁部に前記搭載電子部品群を囲んで配設される樹脂枠と、この樹脂枠外周に嵌合する開口部をもち底面が前記開口部側に凹みかつ複数の貫通口が開

されるとともに前記開口部縁端の一部が端子状に延長されて第1のシールド電極を形成する第1の金属筐体とを有し、前記樹脂枠内と前記金属筐体の凹みに注入されたプリコート樹脂が前記貫通口を介して一体となって固着し前記金属筐体が前記基板に固定された構成にすることがで

【0016】さらに、前記シールド用筐体構造は、前記基板の一方面上の周縁部に前記搭載電子部品群を囲んで配設される樹脂枠と、この樹脂枠外周に嵌合する開口部をもち底面の一部が切り込まれかつ下方に折り曲げられて形成された固定用端子および前記開口部縁端の一部が端子状に延長されて形成された第2のシールド電極をもつ第2の金属筐体とを有し、前記樹脂枠内に注入されたプリコート樹脂が少なくとも前記固定端子を固着することによって前記金属筐体が前記基板に固定された構成にすることもできる。

【0017】さらにまた、前記配線基板は他方面側の略中央部に所定の深さおよび大きさの凹部が開口され、かつその端面に所定の大きさの溝が配設されるとともにこの凹部底面に前記電子部品群の一部を搭載し、前記基板に被せる第3の金属筐体は前記凹部側に凹みかつ複数の貫通口が開口されるとともに縁端の一部が端子状に延長されて形成された第3のシールド電極を有し、前記金属筐体を前記凹部に被せて前記溝と前記シールド電極とが嵌合した状態であって、前記凹部内に注入されたプリコート樹脂が前記貫通口を介して前記金属筐体の凹み上の前記プリコート樹脂と一体となって固着し前記第2の金属筐体が前記基板に固定される構成とすることもできる。

【0018】また、前記配線基板は両面の略中央部に所定の深さおよび大きさの凹部がそれぞれ開口され、かつそれぞれの端面に所定の大きさの溝が配設されるとともにこれらの凹部底面に前記電子部品群をそれぞれ搭載し、前記基板両面に被せる第4および第5の金属筐体は前記各凹部側に凹みかつそれぞれに複数の貫通口が開口されるとともにそれぞれの縁端の一部が端子状に延長されて形成された第4および第5のシールド電極を有し、前記第4および前記第5の前記金属筐体を前記凹部に被せてそれぞれの前記溝と前記第4および前記第5のシールド電極とが嵌合した状態であって、それぞれの前記凹部内に注入されたプリコート樹脂がそれぞれの前記貫通口を介して前記金属筐体の凹み上の前記プリコート樹脂と一体となって固着し前記第4および第5の金属筐体が前記基板にそれぞれ固定された構成とすることもできる。

【0019】さらに、前記溝は、前記第3、前記第4または前記第5のシールド電極表面と前記凹部の端面とが同一平面上に位置する深さにあらかじめ開口される。

【0020】さらにまた、前記第1および前記第2の金属筐体に形成された前記第1および前記第2のシールド

電極が前記基板側面に沿って折り曲げられさらに基板底面側または基板外側に折り曲げられた構造を有することもある。(請求項1)にある。

【0021】

【実施例】次に、本発明の実施例について図面を参照しながら説明する。

【0022】図1は本発明の混成集積回路装置の第1の実施例を示す断面図である。図1を参照すると、この混成集積回路装置は、配線基板1の一方面上の周縁部に部品搭載領域を囲むように樹脂枠2が配設されている。この樹脂枠2は例えばエポキシ樹脂を用いて基板1に接着剤により固定して形成する。部品搭載領域には、ICチップ3が搭載され、その電極群4と部品搭載領域に導体層で形成された配線パターン5とがワイヤ6でボンディング接続されている。

【0023】さらに樹脂枠2にはその外周に嵌合する開口部をもつシールド用の金属筐体7が被せてある。この金属筐体7の底面8は、樹脂枠2で囲まれた内部領域上の部分を基板側に凹ませた凹部9に、複数の貫通口10aおよび10bが開口されている。筐体縁端の一部は端子状に延長されて基板側面に沿うように下へ折り曲げられ、その内側の面が基板1aの下面と同一面になる位置で外側に下り曲げてあり、シールド電極11を形成している。

【0024】金属筐体7は加工し易く、電磁シールド効果の高い金属性の材料を用いることが望ましく、さらに、この混成集積回路装置を搭載する主基板(図示せず)の接地電位にシールド電極11をハンダ接続するために、このシールド電極11の表面をハンダ付け可能な材料で表面処理をするか、金属筐体7自体にハンダ付け可能な材質を用いる必要がある。

【0025】この金属筐体7を被せた樹脂枠2で囲まれた内部のプリコート樹脂12と、金属筐体7の凹部9に注入されたプリコート樹脂12とが貫通口を介して一体となって固着し金属筐体7を固定する構成からなる。

【0026】金属筐体の斜視図を示した図2(a)、基板に樹脂枠を接着した状態の斜視図を示した図2

(b)、樹脂枠に金属筐体を被せた状態の斜視図を示した図2(c)を参照すると、上述したシールド用の金属筐体を実装した混成集積回路装置の製造方法は、電磁シールド効果の高い金属板に一般的な加工技術を用いて折り曲げ、切断、打ち抜き加工を施すことによって、底面の凹部9に貫通口10aおよび10bの開いたシールド電極を設けた金属筐体7を用意する(図2(a))。

【0027】一方、配線基板1aは、公知の印刷配線技術により側面部に複数の表面実装用電極13が配設されており、前述した樹脂枠2が接着され、中央部に半導体チップ3が搭載されている(図2(b))。

【0028】この基板1上の樹脂枠2で囲まれた領域内に公知の樹脂封入技術を用いてプリコート樹脂12を注

入する。プリコート樹脂12が枠内いっぱい満たされる前(例えば枠内容量の90%程度でよい)に一旦注入を止めた状態で、配線基板1に金属筐体7を載置することによって、樹脂枠2の内側に金属筐体7の凹部9を嵌め込んだ状態になり、この凹部9の押下によってプリコート樹脂12が貫通口10から凹部9の表面に押し出され、凹部内一面に広がる。

【0029】この状態で凹部9を満たすまでプリコート樹脂12を再注入した後、乾燥させることにより、樹脂枠2の内部領域のプリコート樹脂12と凹部9に満たされたプリコート樹脂12が貫通口10を介して一体となって固着し、金属筐体7を基板1上に固定する。このときシールド電極11は基板1の側面に沿って伸び基板底面と同一面に位置する状態になっている(図2(b))。

【0030】なお、プリコート樹脂12の注入は、樹脂枠領域内の50%程度で一旦注入を止めた後、金属筐体7を基板1上に載置し、凹部9の平坦部の貫通口10からプリコート樹脂12を再注入することによって凹部9の側面の貫通口10bから凹部9内の空気圧を逃がすことによって凹部10に満たすようにしてもよい。

【0031】上述した製造方法により得られた混成集積回路装置を主基板に搭載するには、主基板上の接地電位電極にシールド電極11を位置合せして載置し、公知のハンダリフロー法により接続する。

【0032】金属筐体7の形状とその載置方法の変形例として、その平面図を示した図3(a)および切断線X-Yにおける断面図を示した図3(b)を参照すると、前述した金属筐体7との相違点は、金属筐体7が筐体底面に凹部9を形成し、この凹部9内に円形の貫通口10を複数個設けたのに対し、金属筐体14の底面を平坦にしたまま、すなわち凹部を形成せずに、矩形状に大きく3辺を切り欠いた貫通口15を形成し、残った1辺を下側に折り曲げて形成した固定用端子16を各辺の貫通口15に配設したことである。その他の形状は金属筐体7と同様である。

【0033】この金属筐体14を用いた場合の混成集積回路装置の製造方法は、樹脂枠2で囲まれた領域内にプリコート樹脂12を注入する。プリコート樹脂12を枠内いっぱい満たした後、配線基板1aに金属筐体14を載置することによって、樹脂枠2の内側に金属筐体14の固定端子16を嵌め込んだ状態になり、プリコート樹脂12が貫通口15を満たした状態で乾燥させることにより、樹脂枠2の内部領域のプリコート樹脂12と固定用端子16を凹部内に固着させ、金属筐体14を基板1a上に固定する。この方法の場合は、プリコート樹脂12の注入工程は1度で済む利点がある。

【0034】次に、本発明の第2の実施例を断面図で示した図4を参照すると、第1の実施例との相違点は、樹脂枠2で囲まれた内部領域には電子部品17が搭載さ

れ、板厚を厚くした基板1bを用いるとともに、この基板1bの裏面側に凹部18が開口され、この凹部底面に半導体チップ3が搭載され、その電極群と凹部18領域に導体層で形成された配線パターンとがワイヤ6でボンディング接続されている。

【0035】さらに基板底面1bにはその外周に嵌合する開口部をもつシールド用の金属筐体19が被せてある。この金属筐体19の凹部底面は複数の貫通口20aおよび20bが開口されるとともに、筐体縁端の一部が端子状に延長されて基板側面に沿うようにL字型に下へ折り曲げられてシールド電極21を形成している。電磁シールド効果の高い金属性の材料を用いることは金属筐体7と同様である。

【0036】上述したシールド電極21が基板1bの周縁部と接する部分はシールド電極21を嵌め込むための溝22が開口されており、その深さは基板端面と嵌め込まれたシールド電極21の表面が同一面に並ぶように予め決めてある。

【0037】この混成集積回路装置を搭載する主基板の接地電位にシールド電極21をハンダ接続するために、このシールド電極21の表面をハンダ付け可能な材料で表面処理をするか、金属筐体19自体をハンダ付け可能な材質を用いることもシールド電極11と同様である。

【0038】なお、樹脂枠2に被せる金属筐体7のシールド電極11は、基板1bの板厚が厚くなった分基板側面に沿って延長される部分が長くなるが、主基板へハンダ付けされる電極部分は実施例1と同様な形状である。

【0039】この金属筐体7を被せた樹脂枠2で囲まれた内部と基板の凹部18内に注入されたプリコート樹脂12がそれぞれの金属筐体7および19の貫通口を介して金属筐体上部のプリコート樹脂12とが一体となって固着しそれぞれの金属筐体を固定する構成からなる。

【0040】金属筐体19および基板1bの斜視図を示した図5(a)および基板1bに金属筐体19を被せるときの部分拡大図を斜視図で示した図5(a)を参照すると、上述したシールド用の金属筐体を両面に実装した混成集積回路装置の製造方法は、第1の実施例と同様に電磁シールド効果の高い金属板に折を曲げ、切断、打ち抜き加工を用いて底面の凹部9および23に貫通口10a、10bおよび20a、20bを開口したシールド電極11および21を設けた金属筐体7および19を用意する。

【0041】一方、配線基板1bは、側面部に複数の表面実装用電極13が配設されており、前述した樹脂枠2が接着され、中央部に電子部品17が搭載され基板裏面の凹部18には半導体チップ3がそれぞれ搭載された基板1bを用意する。

【0042】この基板1b上の樹脂枠2で囲まれた領域内に第1の実施例同様の方法でプリコート樹脂12を注入して、金属筐体7を固定した後に、上下方向を逆にし

て基板凹部側のプリコート樹脂12を注入する。

【0043】この場合もプリコート樹脂12が凹部内いっぱい満たされる前に一旦注入を止めた状態で、配線基板1bに金属筐体19を載置し、基板端面の溝22にシールド電極19を嵌め込んだ状態にすることによって、この凹部18内のプリコート樹脂12が貫通口20aおよび20bから金属筐体19の凹部18の表面に押し出され、凹部内一面に広がる。

【0044】この状態で凹部を満たすまでプリコート樹脂を再注入した後、乾燥させることにより、基板1bの凹部18内のプリコート樹脂と金属筐体19の凹部23に満たされたプリコート樹脂12が貫通口20a、20bを介して一体となって固着し、金属筐体19を基板1b上に固定する。

【0045】このとき金属筐体7のシールド電極11および金属筐体19のシールド電極21は、共にそれぞれの一方が主基板の接地電極と接するように同一平面上に位置する状態になっている。

【0046】上述した製造方法により得られた混成集積回路装置を主基板に搭載するには、主基板上の接地電位電極にシールド電極11および21をそれぞれ位置合せして載置し、ハンダリフロー法により接続する。

【0047】なお、上述した第2の実施例では、基板1bの片面だけに凹部を形成したが、基板1bの両面に同様な凹部を形成してもよい。すなわち、配線基板1bは両面の略中央部に所定の電子部品17または半導体チップ3を搭載できる深さおよび大きさの凹部がそれぞれ開口され、かつそれぞれの端面に所定の大きさの溝が配設されるとともにこれらの凹部底面に電子部品群をそれぞれ搭載する。

【0048】基板1b両面に被せる金属筐体は各凹部側に凹みかつそれぞれに複数の貫通口が開口される。また、それぞれの縁端の一部が端子状に延長されて形成されたシールド電極を有する。金属筐体を凹部に被せてそれぞれの溝と端子電極端部とが嵌合した状態で、それぞれの凹部内に注入されたプリコート樹脂がそれぞれの貫通口を介して一体となって固着し金属筐体が基板に固定された構成でもよい。

【0049】第1および第2の実施例で使用されるプリコート樹脂は、ハンダリフロー法に耐えられる耐熱性の絶縁性樹脂であれば特に限定されない。

【0050】また、金属筐体1aおよび1bの板厚は、薄い場合は加工が簡単であるが接続強度が弱くなり、厚い場合は、接続端子の強度は保たれるが加工が難かしい。したがって板厚は50～250mm程度の材料が望ましい。

【0051】さらに、金属筐体1aおよび1bの形状および貫通口の形状および数量は、上述した実施例の趣旨に沿ったものであれば変形は可能であり、実施例に述べた形状、数量のみに限定されるものではない。

【0052】

【発明の効果】以上説明したように、本発明の混成集積回路装置は、基板の一面上の周縁部に搭載電子部品群を囲んで配設される樹脂枠と、この樹脂枠外周に嵌合する開口部をもち底面が開口部側に凹みかつ複数の貫通口が開口されるとともに開口部縁端の一部が端子状に延長されて第1のシールド電極を形成する第1の金属筐体とを有し樹脂枠内と凹み部に注入されたプリコート樹脂が貫通口を介して一体となって固着し金属筐体を固定する構成と、配線基板の他方面側の略中央部に所定の深さおよび大きさの凹部が開口され、かつその端面に所定の大きさの溝が配設されるとともにこの凹部底面に電子部品群の一部を搭載し、基板に被せる第3の金属筐体は凹部側に凹みかつ複数の貫通口が開口されるとともに縁端の一部が端子状に延長されて形成された第3のシールド電極を有し金属筐体を凹部に被せて溝とシールド電極とが基板端面と平坦に嵌合した状態で、凹部に注入されたプリコート樹脂が貫通口を介して一体となって固着し第2の金属筐体を基板に固定する構成とのいずれかを備えるので、プリコート樹脂の充填とシールド用の金属筐体の接着が同時に出来、製造工程の短縮が可能である。また、金属筐体を部品搭載基板と一体に構成するのでシールド構造のために特別なスペースを必要とせず、実装面積の増加を低く抑えることが出来る。

【0053】さらに、主基板面を平坦のまま実装することが出来るので、シールドのために主基板に対して特別な穴開け加工を必要とせず、主基板に両面実装で混成集積回路装置を混載する場合でも適用することが出来る。

【図面の簡単な説明】

【図1】本発明の第1の実施例を示す断面図である。

【図2】(a)第1の実施例における金属筐体の斜視図である。

(b)基板に樹脂枠を接着した状態の斜視図である。

(c)樹脂枠に金属筐体を被せた状態の斜視図である。

【図3】(a)金属筐体7の形状とその載置方法の変形

例を示す平面図である。

(b)(a)図の切断線X-Yにおける断面図である。

【図4】本発明の第2の実施例を示す断面図である。

【図5】(a)金属筐体19および基板1bの斜視図である。

(b)基板1bに金属筐体19を被せるときの部分拡大図を示した斜視図である。

【図6】(a)ノイズ対策を考慮したこの種の従来の混成集積回路装置の一例を示した断面図である。

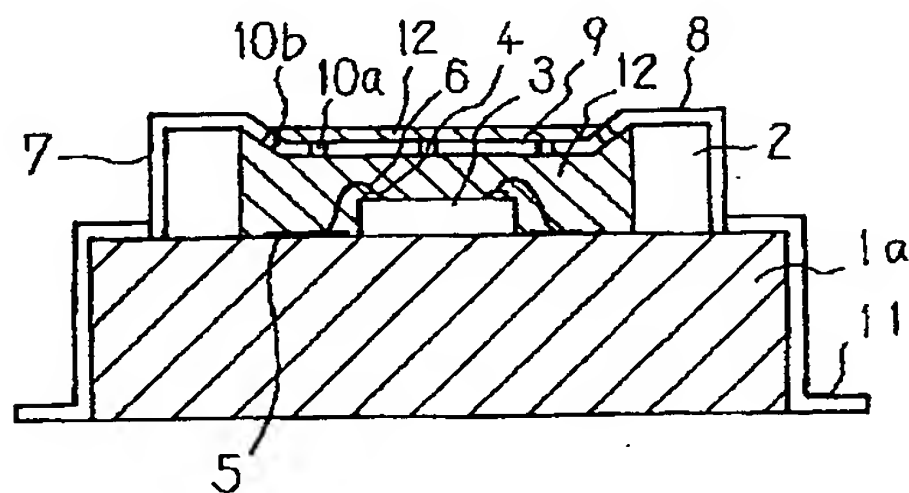
(b)従来の混成集積回路装置の他の例を示した断面図である。

(c)従来の混成集積回路装置のさらに他の例を示した断面図である。

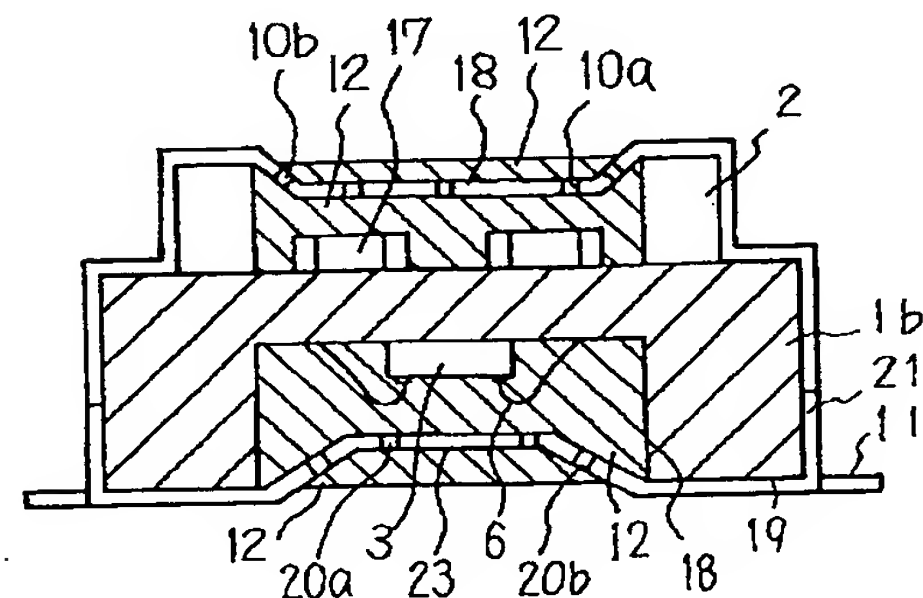
【符号の説明】

- 1a, 1b, 31, 38, 46 配線基板
2 樹脂枠
3, 32, 40, 49 半導体チップ
4 電極群
5, 33 配線パターン
6, 34, 41 ワイヤ
7, 14, 19, 52 金属筐体
8 金属筐体の底面
9, 23 金属筐体の凹部
10a, 10b, 15, 20a, 20b 貫通口
11, 21 シールド電極
12, 35, 42, 50 プリコート樹脂
13 基板電極群
16 固定用端子
17, 47 電子部品
18 基板の凹部
22 溝
24 電子部品
43 主基板
44, 45, 48 接着部材
51 クリップ端子

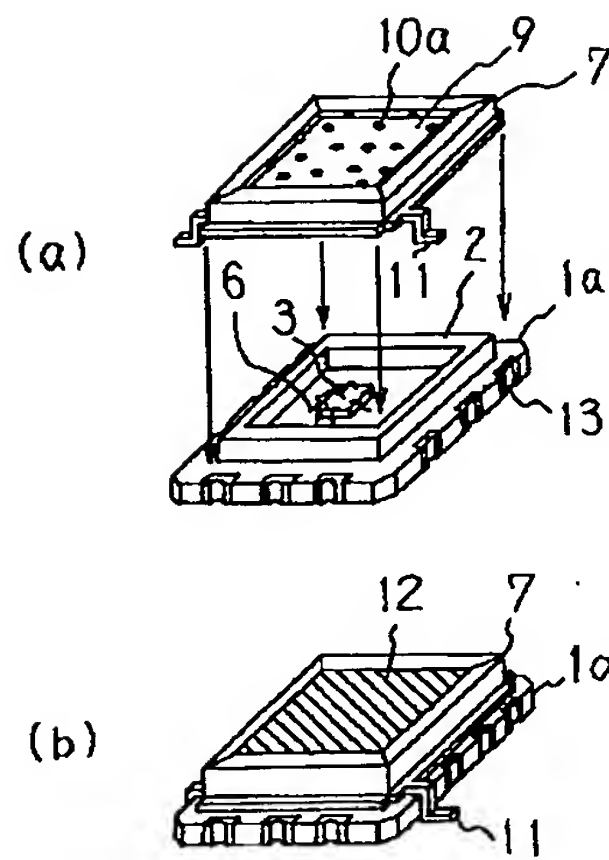
【図1】



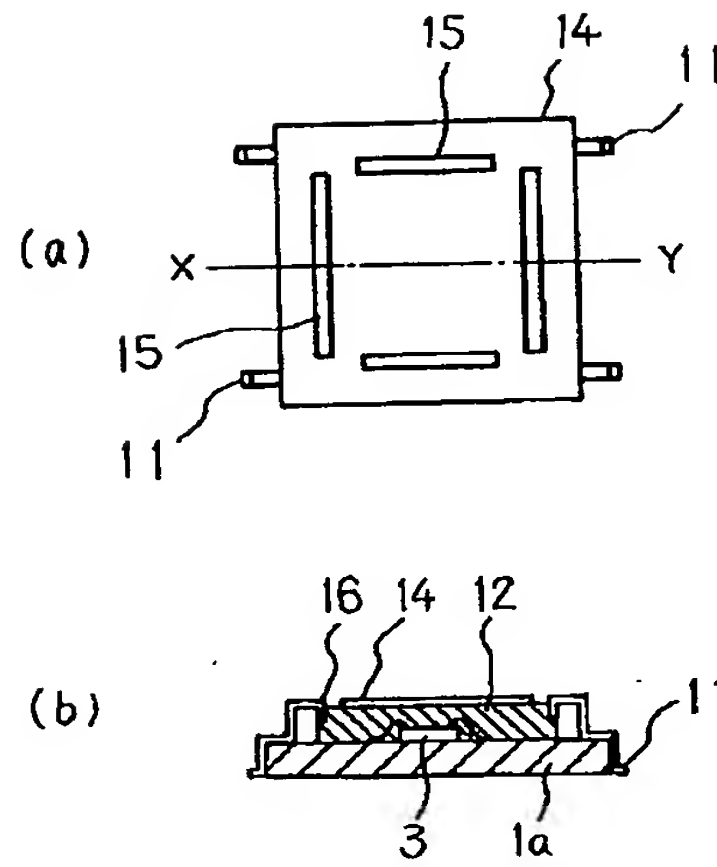
【図4】



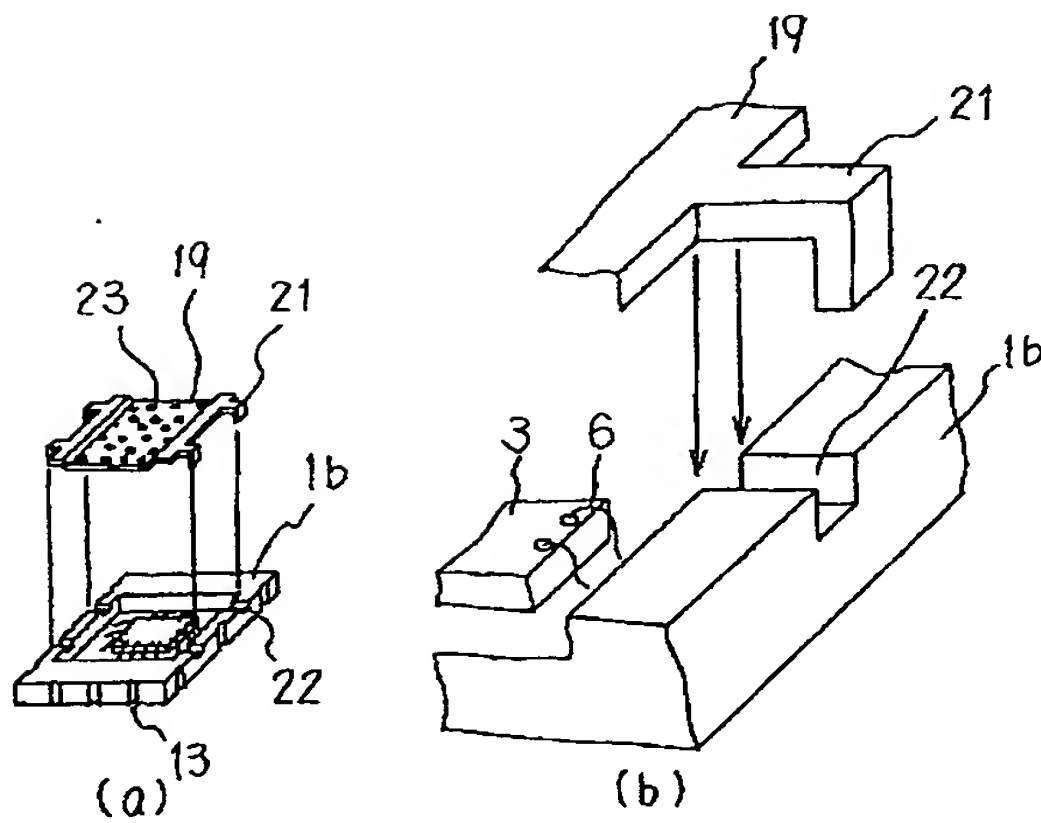
【図2】



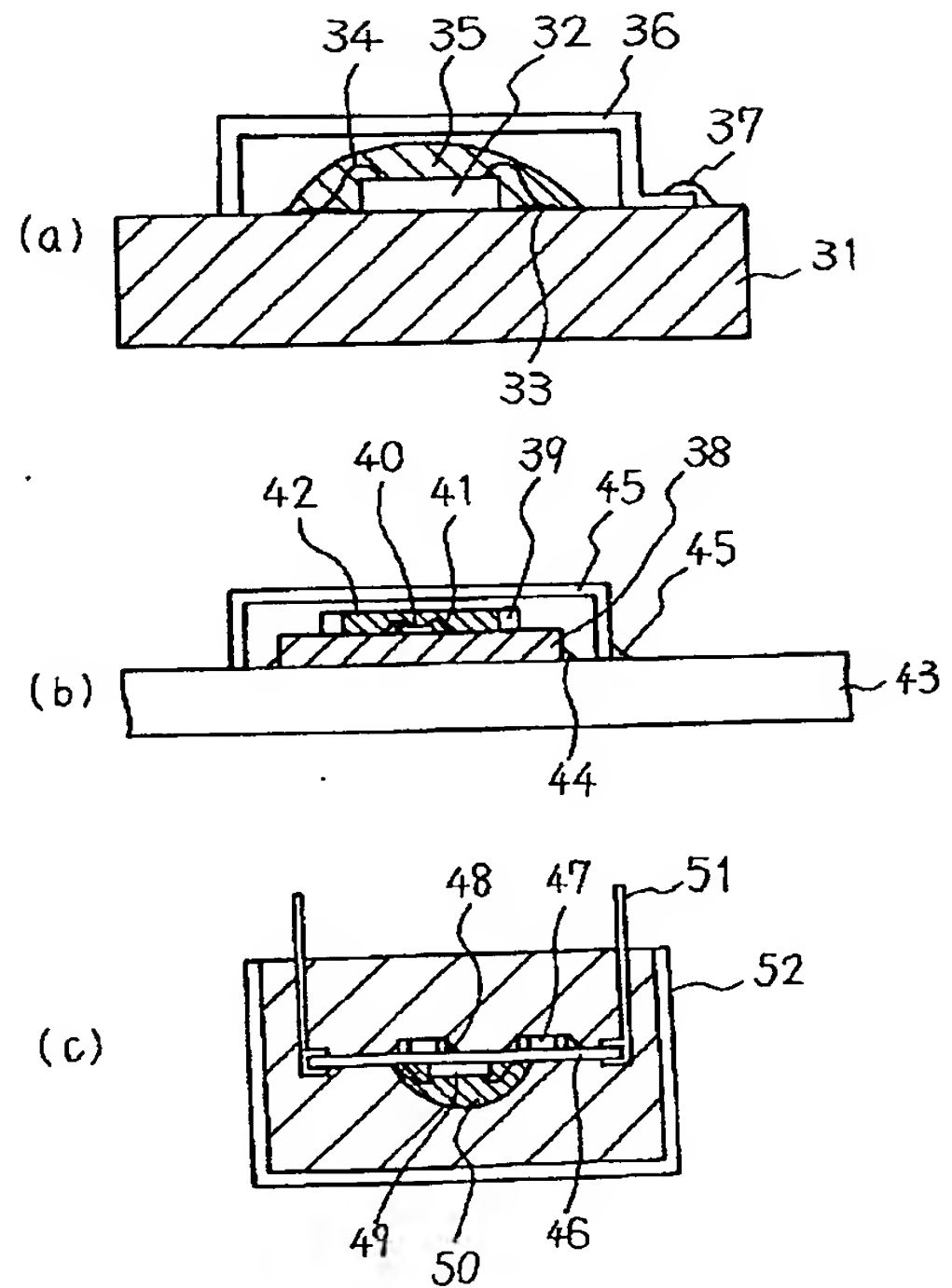
【図3】



【図5】



【図6】



【手続補正書】

【提出日】平成7年7月19日

【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】図2

【補正方法】変更

【補正内容】

【図2】(a) 第1の実施例における金属筐体および基板に樹脂枠を接着した状態の斜視図である。

(b) 樹脂枠に金属筐体を被せた状態の斜視図である。